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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,935	01/16/2004	Brian Barrick	AUS920030971US1	8219

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IBM CORP. (WIP)
c/o WALDER INTELLECTUAL PROPERTY LAW, P.C.
P.O. BOX 832745
RICHARDSON, TX 75083

EXAMINER	
KROFCHECK, MICHAEL C	

ART UNIT	PAPER NUMBER
2186	

DATE MAILED: 03/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/759,935	BARRICK, BRIAN	
	Examiner	Art Unit	
	Michael Krofcheck	2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to application 10/759,935 filed on 1/16/2004.

2. Claims 1-30 have been submitted for examination.

3. Claims 1-30 have been examined.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 23-30 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

6. Claims 23-30 are directed towards a computer program code, which is not tangibly embodied. The computer program code must be tangibly embodied on a on a computer readable medium.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claim 12-13 rejected under 35 U.S.C. 102(b) as being anticipated by Abramson et al., US patent 5898854.

9. With respect to claim 12, Abramson teaches of a method for executing at least one command from at least one command queue of a plurality of command queues, comprising: determining a next command to execute (column 10, lines 17-45; as multiple commands are executed, it must be determined which command is executed);

executing the next command (column 10, lines 17-45; where a load operation is redispatched and completes with returned data);

generating a retire signal (column 14, lines 2-14; where the ROB signals the retirement of an entry by sending their Pdst); and

updating corresponding commands (fig. 11; column 15, lines 58-61; where if a deallocation of the operation occurs, its valid bit is cleared to indicate that the load buffer entry may be reallocated to the allocator).

10. With respect to claim 13, Abramson teaches of wherein the retire signal further comprises command identification (column 14, lines 2-14; where the ROB signals the retirement of an entry by sending their Pdst, which identifies the respective command that is retiring).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Witt, US patent 6141747 and Akkary et al., US patent application publication 2001/0014941.

14. With respect to claim 1, Witt teaches of an apparatus for receiving and executing a plurality of commands, comprising: a plurality of command queues for storing and ordering the plurality of commands as a plurality of command entries (fig. 1, 2; items 36, 60, 64; column 4, lines 5-6; column 11, lines 49-51);

the plurality of commands are at least configured to have the ability to be dependent on one another (fig. 1; column 8, lines 61-66; where map unit provides an indication of the dependencies for each instruction);

the command entries further comprise: an instruction (column 1, lines 44-53; where store instructions are placed in the store queue);

a valid bit to at least indicate if a queue location is valid (fig. 2; column 16, lines 5-7; where the store data queue includes a valid bit to indicate the data is valid).

Witt fails to explicitly teach of at least one dependency bit to at least indicate any commands upon which the instruction is dependent. However, Akkary teaches of at

least one dependency bit to at least indicate any commands upon which the instruction is dependent (fig. 10-13; paragraph 0117, 0119-0128).

Witt and Akkary are analogous arts as they are both in the same field of endeavor, out-of-order processing systems. It would have been obvious to one of ordinary skill in the art having the teachings of Witt and Akkary at the time of the invention to include the dependency field for each instruction of Akkary in the store and load/store queues in Witt. Their motivation would have been to enable procesors to concurrently execute different threads from the same program where there are dependences among the threads (Akkary, paragraph 0009).

15. With respect to claim 2, Witt teaches of wherein at least one command queue of the plurality of command queues is a strict order queue, wherein the strict order queue executes commands in an order of receipt into the strict order queue (fig. 5; column 18, lines 21-25; where the store queue is a FIFO buffer).

16. With respect to claim 3, Witt teaches of wherein the strict order queue further comprises: a newest entry pointer, wherein the newest entry pointer at least indicates a subsequent valid queue location; and an oldest entry pointer, wherein the oldest entry pointer at least indicates a next command for execution (fig. 5; column 18, lines 21-25; where the store queue is a FIFO buffer having a head pointer and a tail pointer).

17. With respect to claim 4, Witt teaches of wherein at least one command queue of the plurality of command queues is a stack down order queue, wherein the stack down order queue at least is configured to have the ability to executes commands in any order (fig. 1, item 36; column 6, lines 3-5).

18. With respect to claim 5, Witt teaches of wherein command entries of stack down order queue further comprise an at least one identification bit to at least individually identify each command entry (fig. 1; column 8, lines 58-61; where each instruction is assigned a queue number).

19. With respect to claim 6, Witt teaches of all the limitations cited with respect to claims 2-6.

20. Claims 7-11 rejected under 35 U.S.C. 103(a) as being unpatentable over Witt, Akkary, and Dautelle, US patent application publication 2004/0015740.

21. With respect to claim 7, Witt teaches of a method for entering at least one command into a plurality of command queues, comprising: determining which command queue of the plurality of command queues at least corresponds to the at least one command (fig. 2; column 12, lines 19-29, column 13, lines 26-33; the store queue stores outstanding store operations within the processor and the load/store queue stores load operations that miss the data cache; it is determined that a store operations is stored in the store queue);

entering the at least one command into the command queue that corresponds (fig. 2; column 12, lines 19-29, column 13, lines 26-33;);

updating a valid bit to indicate that a queue location is valid (fig. 2, 3; column 16, lines 5-10);

Witt fails to explicitly teach of upon entering the at least one command, taking a snapshot of the order of each of the plurality of command queues, determining

if the command is dependent on any other commands to indicate if dependencies exist, and if any dependencies exist, updating at least one dependency in a dependency bit.

However, Akkary teaches of determining if the command is dependent on any other commands to indicate if dependencies exist; and if any dependencies exist, updating at least one dependency in a dependency bit (fig. 13, paragraph 0119-0120; where the dependency bits are computed sequentially).

Dautelle teaches of after entering a command taking a snapshot of the order of the command queue (fig. 1, 3; paragraph 0051, 0061; where a snapshot of the commands provided by the dynamic snapshot generator is stored in the storage device. It is abundantly clear to one of ordinary skill in the art that as the snapshot of the command queue contains the order of the commands. As the commands are being stored in the snapshot in the storage device, it is clear that it is after commands are put in the queue in the snapshot generator).

Witt and Akkary are analogous arts as they are both in the same field of endeavor, out-of-order processing systems. It would have been obvious to one of ordinary skill in the art having the teachings of Witt and Akkary at the time of the invention to include the dependency field for each instruction of Akkary in the store and load/store queues in Witt. Their motivation would have been to enable procesors to concurrently execute different threads from the same program where there are dependences among the threads (Akkary, paragraph 0009).

The combination of Witt and Akkary, and Dautelle are analogous arts as they are both in the same field of endeavor, computer systems keeping track of commands. It

would have been obvious to one of ordinary skill in the art having the teachings of Witt, Akkary, and Dautelle at the time of the invention to create snapshots of the queues in the combination of Witt and Akkary as taught in Dautelle. Their motivation would have been to allow for playback of the system states, Dautelle paragraph 0011.

22. With respect to claims 8, and 10, Witt teaches of the limitations cited with respect to claims 2 and 4 respectively.

23. With respect to claim 9, Witt teaches of wherein the method further comprises if the command at least corresponds to the strict order queue, entering the at least one command into the strict order queue in a location indicated by a newest entry pointer (fig. 5; column 18, lines 21-36; where the store queue's head and tail pointers are incremented and decremented to add and delete stores to the queue).

24. With respect to claim 11, Witt teaches of wherein the method further comprises if the command at least corresponds to the stack down order queue, entering the at least one command into the stack down order queue; and upon entering, updating an identification bit to at least track the command (fig. 1; column 6, lines 3-5; column 8, lines 58-61; where each instruction is assigned a queue number identifying the location within the instruction queues assigned to store the instruction operation. It is abundantly clear to one of ordinary skill in the art that this is done to identify/enable tracking of the instruction).

25. Claims 14, 20-22, 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abramson and Eisen et al., US patent 6289437.

26. With respect to claim 14, Abramson teaches of wherein updating corresponding commands further comprises:

clearing a valid bit to indicate a next valid queue location (fig. 11; column 15, lines 58-61; where if a deallocation of the operation occurs, its valid bit is cleared to indicate that the load buffer entry may be reallocated to the allocator).

Abramson fails to explicitly teach of clearing any dependencies on the executed command in any corresponding command. However, Eisen teaches of clearing any dependencies on the executed command in any corresponding command (fig. 5, 6; column 16, lines 47-49; where the dependency is cleared for an aop when the instruction upon which the "a" operand is dependent is executing in the 3e stage).

Abramson and Eisen are analogous arts as they are both in the same field of endeavor, out-of-order processing systems. It would have been obvious to one of ordinary skill in the art having the teachings of Abramson and Eisen at the time of the invention to incorporate the monitoring and clearing of instruction dependencies as taught in Eisen in Abramson. Their motivation would have been to keep from issuing dependent instructions until their dependencies are met (Eisen, abstract).

27. With respect to claims, 20-21 and 28-29, Abramson teaches of the limitations cited with respect to claims 12-13. It is abundantly clear to one of ordinary skill in the art that the previously cited limitations are operated under control of a processor executing a program. Eisen teaches of a computer program product embodied on a computer medium (column 7, lines 48-67).

Abramson and Eisen are analogous arts as they are both in the same field of endeavor, out-of-order processing systems. It would have been obvious to one of ordinary skill in the art having the teachings of Abramson and Eisen at the time of the invention to include the control code in Abramson as a computer program product on a computer medium. Their motivation would have been to provide mobility and ease of upgrading.

28. With respect to claims 22 and 30, the combination of Abramson and Wisen teaches of the limitations of the respective parent claims. It is abundantly clear to one of ordinary skill in the art that the previously cited limitations are operated under control of a processor executing a program. Additionally Abramson and Eisen teach of the limitations cited with respect to claim 14.

29. Claims 15-19, and 23-27 rejected under 35 U.S.C. 103(a) as being unpatentable over Witt, Akkary, Dautelle, and Eisen.

30. With respect to claims 15-19 and 23-27, Witt, Akkary, and Dautelle teach of the limitations cited with respect to claims 7-11. It is abundantly clear to one of ordinary skill in the art that the previously cited limitations are operated under control of a processor executing a program. Eisen teaches of a computer program product embodied on a computer medium (column 7, lines 48-67).

Witt and Akkary are analogous arts as they are both in the same field of endeavor, out-of-order processing systems. It would have been obvious to one of ordinary skill in the art having the teachings of Witt and Akkary at the time of the invention to include the dependency field for each instruction of Akkary in the store and

load/store queues in Witt. Their motivation would have been to enable procesors to concurrently execute different threads from the same program where there are dependences among the threads (Akkary, paragraph 0009).

The combination of Witt and Akkary, and Dautelle are analogous arts as they are both in the same field of endeavor, computer systems keeping track of commands. It would have been obvious to one of ordinary skill in the art having the teachings of Witt, Akkary, and Dautelle at the time of the invention to create snapshots of the queues in the combination of Witt and Akkary as taught in Dautelle. Their motivation would have been to allow for playback of the system states, Dautelle paragraph 0011.

The combination of Witt, Akkary, and Dautelle and Eisen are analogous arts as they are both in the same field of endeavor, out-of-order processing systems. It would have been obvious to one of ordinary skill in the art having the teachings of Witt, Akkary, Dautelle and Eisen at the time of the invention to include the control code in the combination of Witt, Akkary, and Dautelle as a computer program product on a computer medium. Their motivation would have been to provide mobility and ease of upgrading.

Conclusion

31. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Krofcheck whose telephone number is 571-272-8193. The examiner can normally be reached on Monday - Friday.

33. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

34. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael Krofcheck

MATTHEW D. ANDERSON
PRIMARY EXAMINER